SAI GLOBAL ISO 9001 Quality

TITLE

BASE OPERATIONS
START UP/SHUT DOWN AND CO_2 TANK FILL/REFILL PROCEDURE

APPROVAL SIGNATURES		
PREPARED/REVIEWED BY	CHRISTINA HOLLOWAY, DCA BASE OPERATIONS	DATE 1-14-19
APPROVED BY	DALE MCNALLY, SUPERVISOR EQUIPMENT MAINTENANCE DIVISION	DATE 1/10/19
APPROVED BY	TYLER VIANI, ASSISTANT MANAGER INFRASTRUCTURE MAINTENANCE	DATE 1/10/19
APPROVED BY	TIMOTHY RUTHERFORD, FIRE CHIEF FIRE & EMERGENCY SERVICES	DATE 1/10/19
APPROVED BY	BURTON PACKARD, DIRECTOR BASE OPERATIONS	DATE 1/14/19
APPROVED BY	EARNIE WOOD, DEPUTY DIRECTOR MAINTENANCE OPERATIONS	DATE 1/14/19
APPROVED BY	THERESA VINSON, DIRECTOR BUSINESS MANAGEMENT OFFICE	DATE 1/10/19

[ ] INITIAL RELEASE [ ] REVIEW, NO REVISION REQUIRED [X] REVIEW - REVISION REQUIRED (SEE HISTORY BELOW)

REVISION HISTORY			
REV	**CHANGE DESCRIPTION**	**AUTHOR**	**DATE**
9	***Annual Review:*** Updated signatory authority to reflect current required signatures. Updated document from a Quality Plan to a Management Plan. Updated Requisition form.	**Christina Holloway**	**01/2019**
8	***Annual Review*** Updated signatory authority to reflect current required signatures. Changed document to new ISO 9001:2015 format.	**Christina Holloway**	**01/2018**
7	***Annual Review*** Updated signatory authority to reflect current required signatures. Reformatted QP to comply with current ISO Standards. Updated Reference Document Number – Lockout/Tagout Procedures. Added Section 11 Attachments.	**Karli Wilbur**	**01/2017**

REFERENCE DOCUMENTS	
DOCUMENT NUMBER	**DOCUMENT TITLE**
S/N 30000038 Revision C	Chemetron Low Pressure Carbon Dioxide Operation & Maintenance Manual for 4, 6, 8, 10 Ton Storage Units.
DPD.IOP.FES.0015	Testing, Inspection & Maintenance of CO2 Fire Suppression System 110 Hg & Storage
BOP.IOP.EMB.1300	Refrigeration and Maintenance Plan for Mercury Storage
QMP.DZHC.0011	Base Operations QMP (currently under assimilation to QMS)
QP.BOP.MUO.0001	Lockout/ Tagout Procedures
CGA 6.7-1996	Compressed Gas Association- Safe Handling of Liquid Carbon Dioxide Containers That Have Lost Pressure
NFPA 72	National Fire Alarm Code
NFPA 12	Standard on Carbon Dioxide Extinguishing Systems

DOCUMENTS REFERENCED IN THIS PROCEDURE ARE APPLICABLE TO THE EXTENT SPECIFIED HEREIN.

OPERATOR'S STATEMENT

SOC
A DAY & ZIMMERMANN COMPANY

Mercury Storage & Transfer Maintenance Operator's Statement

MERCURY STORAGE & TRANSFER MAINTENANCE	Start Up Shut Down & CO_2 Tank Fill/ Refill Procedure
DOCUMENT NUMBER:	QP.BOP.EMD.1301
INSTRUCTION/TRAINING/DOCUMENT REVIEW PROVIDED BY:	

Employees are required to sign this statement:

1. *When initially assigned to perform this task*
2. *When there has been a change to this procedure and it has affected supporting procedures and/or a Management of Change has been initiated.*
3. *At least annually.*

I have read, or have had read to me, and understand the general, specific safety and environmental requirements, the personnel limits, work description and inspection requirements required to accomplish my part in this process safely. I have been trained and I agree to follow procedure requirements as stated in this procedure without deviation.

I will bring all unsafe work conditions, environmental considerations, and/or facility defects that are beyond my control to correct, to the attention of my immediate supervisor or call 7911 (945-7911) in the event of an emergency.

EMPLOYEE SIGNATURE	EMPLOYEE NAME PRINTED	POSITION/TITLE	DATE

1. PURPOSE

1.1 This quality plan provides the policies, responsibilities and procedures for the procurement, delivery and filling of CO_2 low pressure gas for the Mercury Storage fire suppression systems in the 110 area.

2. SCOPE

2.1 This quality plan applies to the fourteen (14) Mercury Storage fire suppression systems manufactured by *Chemetron*.

3. POLICY

3.1 This procedure is initiated by the following methods: **Trouble Call**

4. DEFINITIONS AND ACRONYMS

4.1 **BOP-** Base Operations Directorate

4.2 **CGA-** Compressed Gas Association

4.3 **CO_2-** Carbon Dioxide

4.4 **EMD-** Equipment Management Division

4.5 **HWAD-** Hawthorne Army Depot

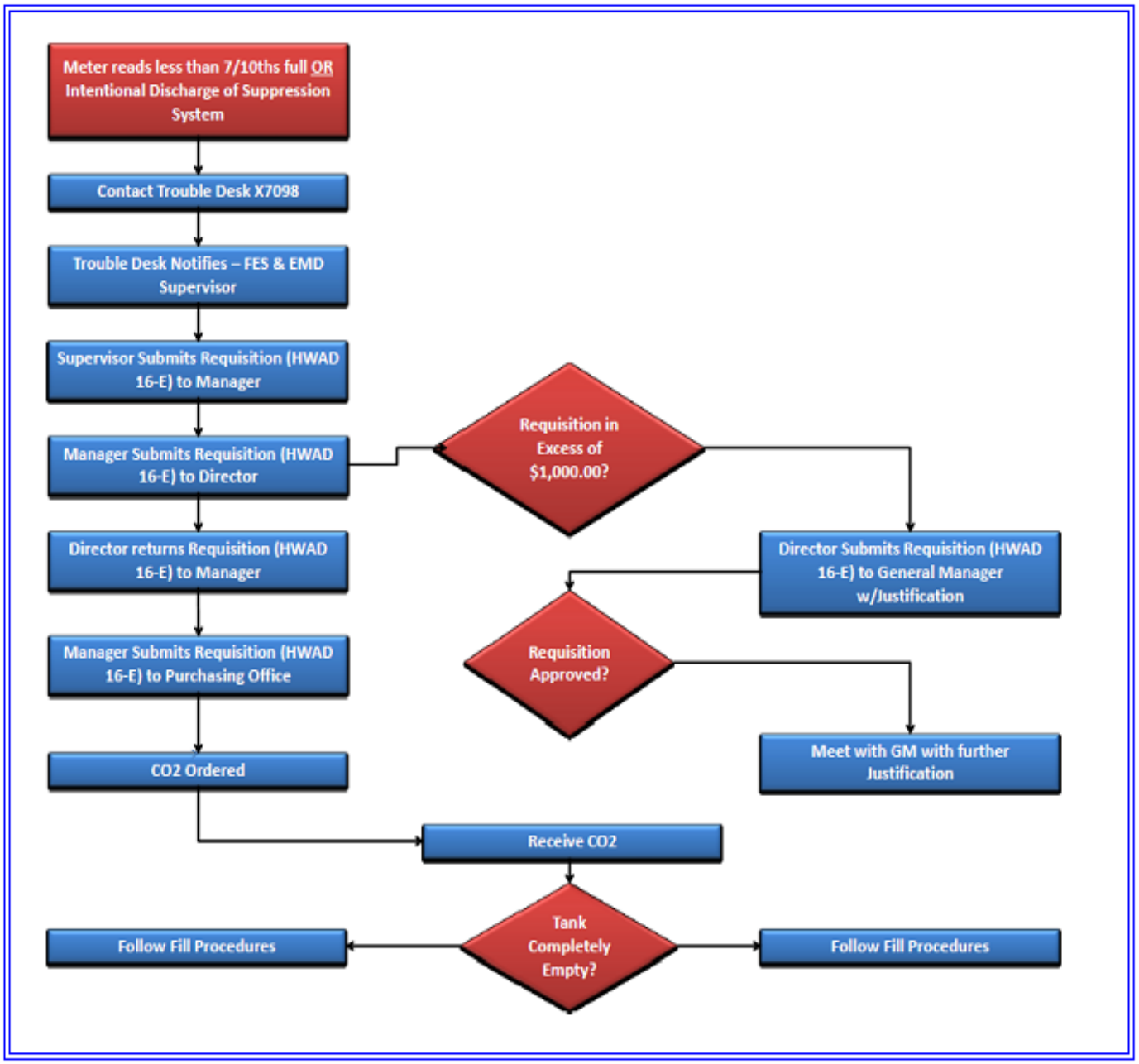
4.6 **IAW-** In Accordance With

4.7 **QMS-** Quality Management System

4.8 **MP-** Management Plan

5. FLOWCHART

5.1 Initiation of Carbon Dioxide (CO_2) Procurement



6. RESPONSIBILITIES

NOTE

These two valve adapters are distinctly different and unique to this series of 14 CO2 tanks. Without the adapters, filling from any commercial CO2 delivery supply tank truck cannot occur.

6.1 Fire Department:

6.1.1 Control and delivery of CGA valve adapters for Vent Return Valve (6) and Fill Line Valve (7).

6.1.2 Control of keys to unlock Vent Return Valve (6) and Fill Line Valve (7) per IAW Fire Department Key Program.

6.1.3 Will be present at facility during initial tank filling, refilling, testing, inspecting and maintenance.

6.1.4 Adherence to SOC.OHS.SP.0002 Lockout/Tagout.

6.2 Air Conditioning Equipment Mechanic:

6.2.1 Verifying proper operation of refrigeration unit as specified in "*Operation & Maintenance Manual S/N 30000038"* and "*Refrigeration and Maintenance Plan for Mercury Storage BOP.IOP.EMB.1300*."

6.2.2 Confirm Refrigeration Unit power and alarm power is disconnected during Initial Start-Up Procedure.

6.2.3 Adherence to *SOC.OHS.SP.0002 Lockout/Tagout*.

6.3 Supervisors and Managers:

6.3.1 INITIATING DZHC FORM 16E.

7. PROCEDURE

7.1 Carbon Dioxide Procurement

7.1.1 Refer to SOC Purchasing Manual QP.SOC.0011

7. PROCEDURE (CONTINUED)

7.1.2 Providing vendor shall comply with CGA 6.7-1996 (requirement must be identified in the requisition when submitted to procurement).

7.1.3 Carbon Dioxide Quality

7.1.3.1 Carbon dioxide used for filling the storage unit shall be of good commercial grade, free of water and other contaminants that might cause storage tank corrosion or interfere with free discharge through the CO_2 nozzles.

7.1.3.2 Carbon Dioxide Minimum Specification

MINIMUM SPECIFICATIONS FOR CO_2 ACCEPTANCE		
DESCRIPTION	**UNIT**	**VALUE**
Vapor Phase	Percent of CO_2	≥ 99.5%
Odor or Off Taste		No-Detectable
Water Content (Liquid Phase)	Percent by Weight	0.01
Oil Content	PPM	10

7.2 **Start up Procedure- Empty Tank Filling Procedure**

7.2.1 Micro-1EV power and battery back-up power to be disconnected at circuit breaker #8 at Main Breaker panel board 110-Y-XX and shall remain disconnected until initial filling procedure is complete.

7.2.2 Refrigeration power to be disconnected at “Refrigeration Motor Disconnect” located adjacent to Micro-1EV and shall remain disconnected until initial filling procedure is complete.

7.2.3 After Initial Filling Procedure is complete the *Air Conditioning Equipment Mechanic* shall verify proper operation of Refrigeration unit as specified.

7.2.4 Filling Storage Unit.

NOTE

The following procedure is for reference ONLY as filling the storage unit shall be done by a qualified *Carbon Dioxide Equipment Specialist*.

7. PROCEDURE (CONTINUED)

1. Connect the CGA valve adaptors to tank valves (6) and (7) (Figure 7.1.3.1).
2. Connect the liquid fill and the vent return hose on the supply truck to the CGA valve adaptors on the storage tank.
3. Open both the liquid fill line valve on the storage unit and on the supply truck.
4. Start the operation of the transfer pump on the supply truck.
5. Continue pumping until the tank is completely full.
6. Stop the operation of the transfer pump on the supply truck.
7. Close the liquid fill and vapor equalizing line valves on the storage unit.
8. After a brief period (sufficient time to allow liquid in line to return to truck) close the liquid fill and vapor equalizing line valves on the supply truck.
9. Immediately bleed pressure out of the liquid fill line.

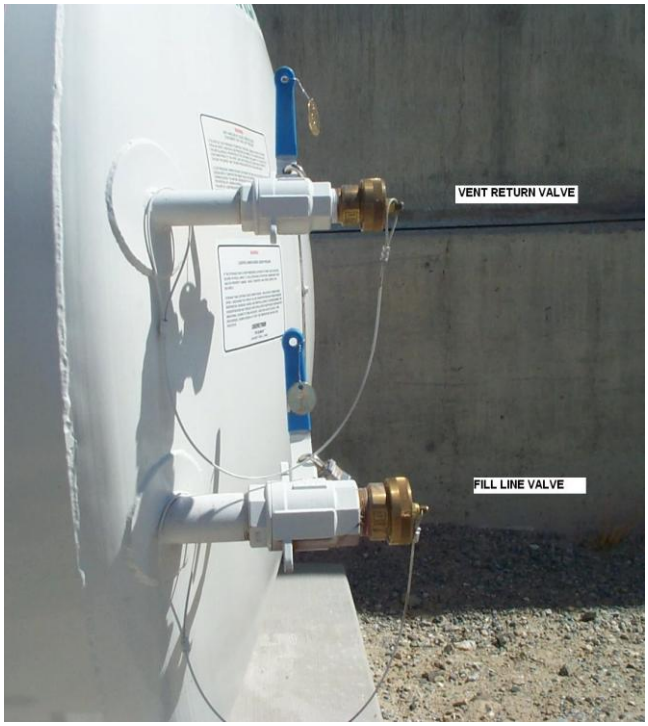


Figure 7.1.3.1

7. PROCEDURE (CONTINUED)

7.2.5 Liquid Level During Filling - *There are two ways to determine whether the tank is full.*

NOTE

It is important that the tank be filled completely but not overfilled.

7.2.5.1 Liquid Level Gauge

The storage unit liquid level gauge indicates the contents of the tank (in tenths of full capacity) during the filling operation. There is a slight time lag in indication during filling.

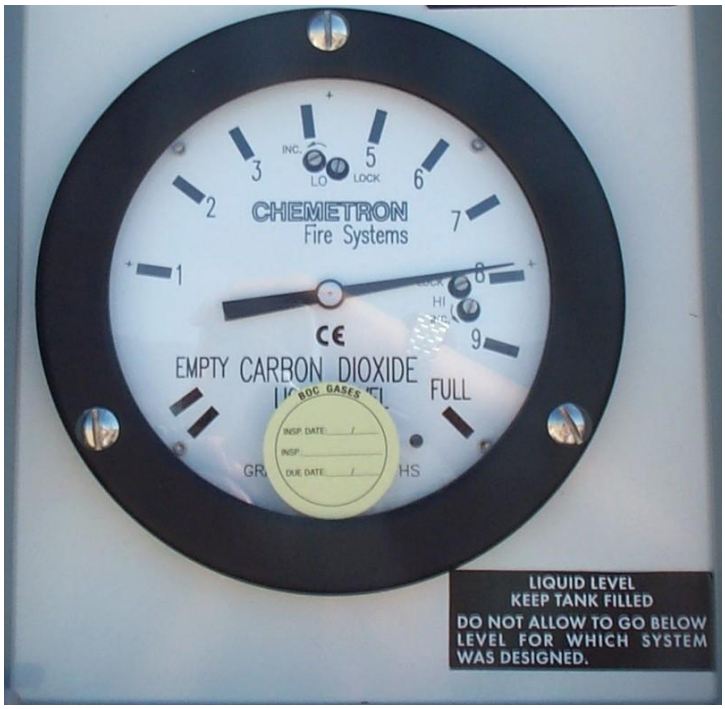


Figure 7.1.6

7.2.5.2 Frost on Liquid Vapor Line

7.2.5.2.1 Carbon Dioxide liquid enters at the bottom of the tank while the carbon dioxide vapor flows out through the top of the tank.

7. PROCEDURE (CONTINUED)

When the liquid level in the tank rises to the bottom of the vapor equalizing tube, the tank is at full capacity.

If pumping is continued after this point is reached, the liquid carbon dioxide will enter the vapor equalizing line.
The cold liquid in the vapor equalizing line will cause the line to accumulate frost and indicate that complete filling has been obtained.

7.2.6 Purging Unit

NOTE
Purging of the storage unit shall be done by a Qualified Carbon Dioxide Equipment Specialist.

7.2.6.1 For additional information reference Attachment 11.2 “Refrigeration and Maintenance Plan Chemetron S/N 30000038 Revision C.”

7.3 Refilling Storage Unit

NOTE
Any time the storage unit is less that 7/10 full on the Liquid Level Gauge and is approaching the minimum level required for fire protection; arrange to refill the tank at once. Continue fire protection on a sufficient supply of carbon dioxide in storage

7.3.1 Operating power to the refrigeration unit and alarm circuit shall remain connected during the refilling procedure.

7.3.2 Minimum Carbon Dioxide level

7.3.2.1 70% or 7/10 (Metrics 8.2) as displayed on Liquid Level Gauge (Figure 7.1.6)

7.3.3 Liquid Level during filling- Refer to 7.2.5

7.3.4 Carbon Dioxide Quality- Refer to 7.1.3

7.4 Shutdown Procedure

7. PROCEDURE (CONTINUED)

7.4.1 In the event that the unit is completely empty due to a malfunction or through normal operation of the fire suppression system, initiate the following shutdown procedure.

7.4.1.1 Valves (1) through (7) (Metrics 8.1) locked in the closed position.

7.4.1.2 Valves 1, 2 and 3 are located inside the Micro1-EV cabinet. Lockout/Tagout for those valves will be accomplished by placing each valve in the closed position and locking and tagging the Micro1-EV cabinet following the Lockout/Tagout Procedure.

7.4.1.3 Valves 4, 5, 6 and 7 are located on the piping on the exterior of the CO_2 tank and can be locked out/tagged out following the normal Lockout/Tagout Procedures.

7.4.1.4 Refrigeration Unit power and battery back-up power to be disconnected until unit is filled with CO_2 (Refrigeration Power noted in 7.2.2).

7.4.1.5 Disconnect Micro 1-EV Circuit until unit is filled with CO_2 (Alarm Power noted in 7.2.1).

7.4.1.6 To fill CO_2 tank, follow *Initial Start-Up* (Noted in 7.2).

8. METRICS

8.1 **System Valves**

8.1.1 Tags are applied to each valve and numbered for easy identification.

Tag Number	Description
1	Janesbury Ball Valve
2	Pilot Valve
3	Cardox Plunger
4	Pilot Line Valve
5	Main Discharge Valve
6	Vent Return Valve
7	Fill Line Valve
8	Safety Relief Vents

8.2 **CO_2 Tank level Calculation**

8.2.1 Tank Capacity = 12,000 lbs.
Estimated Discharge Capacity = 7,624 lbs.
Tank Capacity (Safety Factor) = 12000 x 90% = 10,800 lbs.

8. METRICS (CONTINUED)

$$\text{Minimum Tank Volume} = \frac{\text{CO2 Discharge Capacity}}{\text{Tank Capacity (Safety Factor)}} \times 100\%$$

Or

$$\frac{7{,}624 lbs.}{10{,}800 lbs.} \times 100\% = 70.6\%$$

9. RECORDS

9.1 The following Quality Records shall be generated and managed in accordance with SOC.QP.QMS.0002

QUALITY RECORDS			
RECORD REQUIRED	CUSTODIAN	RETENTION	DISPOSITION
Not Applicable	Not Applicable	N/A	N/A

10. FORMS

10.1 The following forms are applicable to this document

APPLICABLE FORMS	
FORM NUMBER	TITLE
DZHC 16-E	Requisition Form
Chemetron 2.12.3.1	Operation and Maintenance Manual- Purging the Unit

11. ATTACHMENTS

11.1 DZHC 16-E Requisition Form

REQUISITION #_____

Name & Employee ID:	Proj. # / Charge Code:	Org #:	Account #:	Preferred Vendor:
Deliver To:	Requested Delivery Date:	Notes:		

Is This Purcahse: (*Section must be completed or requisition will be REJECTED*)

☐ Computer, Hardware, Software, Etc.	☐ Equipment
☐ Furniture	☐ Tools
☐ Real Property (Equipment Attached to Bldg #)	☐ Calibration Equipment (TMDE)
☐ None of the Above	☐ PPE items have BEEN APPROVED by SAFETY

Additional Requirements: (*Section must be completed or the requisition will be REJECTED*)

COC Required: ☐ YES ☐ NO 1ST Article Inspection Required: ☐ YES ☐ NO Partial Shipments Accepted: ☐ YES ☐ NO

Vendor Manufacturer Part #	Description / Line Notes	Vendor UM (EA, BX, Etc.)	Quantity UM	Est. Unit Cost	SUBTOTAL	Est. Freight
					$ 0.00	
					$ 0.00	
					$ 0.00	
					$ 0.00	
					$ 0.00	
					$ 0.00	
					$ 0.00	
					$ 0.00	
					$ 0.00	

Approved: **Total Cost** $ 0.00

General Manager *Date* *Supervisor/Manager/Director* *Date*

DZHC 16-E REV.6 (11/18)

11. ATTACHMENTS (CONTINUED)

11.2 Chemetron 2.12.3.1 - Operation and Maintenance Manual- Purging the Unit

CHEMETRON Fire Systems

LOW PRESSURE CARBON DIOXIDE OPERATION & MAINTENANCE MANUAL FOR 4, 6, 8, & 10 TON STORAGE UNITS

CAUTION

CO_2 DISCHARGING FROM THE OPEN PIPES WILL PRODUCE NOISE, TURBULENCE, LOW TEMPERATURES IN THE DISCHARGE STREAM AND POSSIBLY CAUSE DEBRIS AND SMALL PARTICLES TO BE PROPELLED ABOUT WITH CONSIDERABLE FORCE - DANGEROUSLY HIGH CONCENTRATIONS OF CO_2 COULD RESULT IN THE AREA NEAR THE DISCHARGE. ***TAKE APPROPRIATE SAFETY MEASURES TO PREVENT EXPOSURE OF PEOPLE TO UNACCEPTABLE CO_2 CONCENTRATIONS.*** *WEAR PROTECTIVE EQUIPMENT TO GUARD AGAINST INJURY FROM FLYING DEBRIS AND HIGH NOISE LEVELS. DO NOT HANDLE CO_2* ***SNOW*** *(DRY ICE PARTICLES) -* ***BURNS*** *FROM THE LOW TEMPERATURE PARTICLES CAN RESULT.*

D. Keep valves on truck closed.

E. Open liquid fill line valve on storage unit.

F. Put on hearing protection.

G. Open the vapor equalizing line valve on the storage unit (remove lock).

H. Open the vapor equalizing line valve on the supply truck to purge storage unit of moisture. Leave the tank liquid fill line valve(s) open long enough to discharge any moisture or foreign particles that may have been present inside the tank. Close the liquid fill line. Generally any moisture will be cleared from the unit after 30-40 seconds of purging with vapor.

NOTE

IF MOISTURE CANNOT BE READILY PURGED, IT MAY BE NECESSARY TO EMPTY AND PREPARE THE TANK FOR AN INTERNAL VISUAL INSPECTION. THIS WILL REQUIRE REMOVAL OF THE MANWAY, VENTILATION OF THE INTERIOR OF THE PRESSURE VESSEL, AND EXECUTION OF OSHA REQUIRED PROCEDURES FOR CONFINED SPACE ENTRY. VISUAL INSPECTION SHOULD BE DONE TO DETERMINE THE SOURCE OF THE EXCESS MOISTURE AND APPROPRIATE MEASURE TAKEN TO REMEDY THE SITUATION).

I. Purge the storage unit using CO_2 supplier's standard procedure. If supplier has no set procedure for purging or does not have a purity tester available to check for air in the storage unit, the following procedure should be followed:

1) Pressurize to 10 PSIG, allow to stand 2 minutes.

2) Blow down to 2 PSIG through liquid fill line valve.

3) Repeat steps 1 and 2 at least 5 times.